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Volume 2: Firearms *AC Electric Motors Control Electrochemical*
Membrane Technology for Water and Wastewater Treatment
Handbook of Science & Engineering of Green Corrosion Inhibitors
Merck's Annual Report of Recent Advances in Pharmaceutical
Chemistry and Therapeutics E. Merck's Annual Report of Recent
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Functions and Analysis of Differential Equations Theory of

Fractional Evolution Equations Intelligent Systems Modeling and Simulation II *Study Guide with Selected Solutions* Introduction to the Study of Law Particle Accelerator Design: Computer Programs Surfactants in Tribology, Volume 4 *Mathematical Topics on Modelling Complex Systems*

This multi-volume handbook is the most up-to-date and comprehensive reference work in the field of fractional calculus and its numerous applications. This eighth volume collects authoritative chapters covering several applications of fractional calculus in engineering, life and social sciences, including applications in signal and image analysis, and chaos. Surface science and tribology play very critical roles in many industries. Manufacture and use of almost all consumer and industrial products rely on the application of advanced surface and tribological knowledge. The fourth in a series, *Surfactants in Tribology, Volume 4* provides an update on research and development activities connecting surfacta This book presents several aspects of research on mathematics that have significant applications in engineering, modelling and social matters, discussing a number of current and future social issues and problems in which mathematical tools can be beneficial. Each chapter enhances our understanding of the research problems in a particular an area of study and highlights the latest advances made in that area. The self-contained contributions make the results and problems discussed accessible to readers, and provides references to enable those interested to follow subsequent studies in still developing fields. Presenting real-world applications, the book is a valuable resource for graduate students, researchers and educators. It appeals to general readers curious about the practical applications of mathematics in diverse scientific areas and social problems. This interesting collection of up-to-date survey articles on various topics of current mathematical research presents extended versions of the

plenary talks given by important Greek mathematicians at the congress held in Athens, Greece, on occasion of the celebration for the 100 years of the Hellenic Mathematical Society. Dairy foods account for a large portion of the Western diet, but due to the potential diversity of their sources, this food group often poses a challenge for food scientists and their research efforts. Bringing together the foremost minds in dairy research, *Handbook of Dairy Foods Analysis, Second Edition*, compiles the top dairy analysis techniques and methodologies from around the world into one well-organized volume. Exceptionally comprehensive in both its detailing of methods and the range of dairy products covered, this handbook includes tools for analyzing chemical and biochemical compounds and also bioactive peptides, prebiotics, and probiotics. It describes noninvasive chemical and physical sensors and starter cultures used in quality control. This second edition includes four brand-new chapters covering the analytical techniques and methodologies for determining bioactive peptides, preservatives, activity of endogenous enzymes, and sensory perception of dairy foods, and all other chapters have been adapted to recent research. All other chapters have been thoroughly updated. **Key Features:** Explains analytical tools available for the analysis of the chemistry and biochemistry of dairy foods Covers a variety of dairy foods including milk, cheese, butter, yogurt, and ice cream Analysis of nutritional quality includes prebiotics, probiotics, essential amino acids, bioactive peptides, and healthy vegetable-origin compounds Includes a series of chapters on analyzing sensory qualities, including color, texture, and flavor. Covering the gamut of dairy analysis techniques, the book discusses current methods for the analysis of chemical and nutritional compounds, and the detection of microorganisms, allergens, contaminants, and/or other adulterations, including those of environmental origin or introduced during processing. Other methodologies used to evaluate color, texture, and flavor are also

discussed. Written by an international panel of distinguished contributors under the editorial guidance of renowned authorities, Fidel Toldrá and Leo M.L. Nollet, this handbook is one of the few references that is completely devoted to dairy food analysis – an extremely valuable reference for those in the dairy research, processing, and manufacturing industries. This Special Edition contains new results on Differential and Integral Equations and Systems, covering higher-order Initial and Boundary Value Problems, fractional differential and integral equations and applications, non-local optimal control, inverse, and higher-order nonlinear boundary value problems, distributional solutions in the form of a finite series of the Dirac delta function and its derivatives, asymptotic properties' oscillatory theory for neutral nonlinear differential equations, the existence of extremal solutions via monotone iterative techniques, predator–prey interaction via fractional-order models, among others. Our main goal is not only to show new trends in this field but also to showcase and provide new methods and techniques that can lead to future research. This book constitutes revised and selected papers of the First International Conference on Computational Sciences - Modelling, Computing and Soft Computing, held in Kozhikode, Kerala, India, in September 2020. The 15 full papers and 6 short papers presented were thoroughly reviewed and selected from the 150 submissions. They are organized in the topical sections on computing; soft computing; general computing; modelling. Particle Accelerator Design: Computer Programs describes some of the most important computer programs applicable to the design of particle accelerators. Computer programs that calculate magnetic and electric fields are considered, along with programs that calculate orbits of particles in a magnetic and/or electric field. Some representative programs useful in the design of linear accelerator-type cavities are also discussed. This book is comprised of six chapters and begins with a review of two-

dimensional magnetostatic programs, including TRIM, LINDA, NUTCRACKER, MAREC, GRACY, and COILS. The University of Colorado's magnet program is also examined. The next chapter is devoted to programs capable of solving problems relating to the calculation of electrostatic fields in two-dimensional geometries. The reader is also introduced to programs that perform calculations of three-dimensional linear and nonlinear problems, along with programs that employ matrix formalism and integration of equations of motion. The final chapter looks at programs for linear accelerator-type cavities, including CURE, JESSY, MESSYMESH, and AZTEC. This monograph will be a useful resource for physical scientists, engineers, and computer programmers.

Handbook of Science and Engineering of Green Corrosion Inhibitors: Modern Theory, Fundamentals and Practical Applications presents developments in green corrosion inhibitors and current applications. The book provides an overview of green corrosion inhibitors such as plant extracts, chemical medicines, natural polymers, synthetic green compounds, carbohydrates, amino acids and oleochemicals that can cost-effectively minimize corrosive damage. The book handles several compounds used as anticorrosive materials for different metals and alloys in a versatile corrosive environment. Sections address the fundamental characteristics of green corrosion inhibition and deal with the economic impact of corrosion and forms of corrosion, while also assessing and classifying corrosion inhibitors. The book covers a broad range of applications in green corrosion inhibition and concludes with new emerging trends in corrosion protection such as high temperature corrosion and its protection and nanomaterials as corrosion inhibitors. Provides an overview of environmentally sustainable (green) corrosion inhibitors utilized in modern industrial platforms Evaluates corrosion inhibitors as prime options for sustainable and transformational opportunities Serves as a valuable reference for scientists and engineers who are searching modern

design for corrosion inhibitors Covers both synthetic and natural environmentally-friendly corrosion inhibitors The Palgrave Handbook of International Communication and Sustainable Development is a major resource for stakeholders interested in understanding the role of communication in achieving the UN'S Sustainable Development Goals. Bringing together theoretical and applied contributions from scholars in Europe, Africa, the Middle East, Asia and North America, the handbook argues that communication is a key factor in achieving the global goals and suggests a review of the SDGs to consider its importance. Reflecting on the impact of COVID-19, it highlights the need for effective communication infrastructure and critically assesses the 2030 agenda and timeline. Including individual SDG and country case studies as well as integrated analysis, the chapters seek to enrich understanding of communication for development and propose crucial policy interventions. It is critical reading for researchers as well as policy makers and NGOs. This extremely readable, highly regarded, and widely adopted text present innovative ways for applying calculus to real-world situations in the business, economics, life science, and social science disciplines. The text's straightforward, engaging approach fosters the growth of both mathematical maturity and an appreciation for the usefulness of mathematics. The authors' tried and true formula -- pairing substantial amounts of graphical analysis and informal geometric proofs with an abundance of hands-on exercises -- has proven to be tremendously successful. Functions, derivatives, applications of the derivative, techniques of differentiations, exponential and natural logarithm functions, definite integral, variables, trigonometric functions, integration, differential equations, Taylor polynomials and probability. For individuals interested in an introduction to calculus applications. Fractional evolution equations provide a unifying framework to investigate wellposedness of complex systems with fractional order derivatives.

This monograph presents the existence, attractivity, stability, periodic solutions and control theory for time fractional evolution equations. The book contains an up-to-date and comprehensive stuff on the topic. Differential Equations are very important tools in Mathematical Analysis. They are widely found in mathematics itself and in its applications to statistics, computing, electrical circuit analysis, dynamical systems, economics, biology, and so on. Recently there has been an increasing interest in and widely-extended use of differential equations and systems of fractional order (that is, of arbitrary order) as better models of phenomena in various physics, engineering, automatization, biology and biomedicine, chemistry, earth science, economics, nature, and so on. Now, new unified presentation and extensive development of special functions associated with fractional calculus are necessary tools, being related to the theory of differentiation and integration of arbitrary order (i.e., fractional calculus) and to the fractional order (or multi-order) differential and integral equations. This book provides learners with the opportunity to develop an understanding of advancements of special functions and the skills needed to apply advanced mathematical techniques to solve complex differential equations and Partial Differential Equations (PDEs). Subject matters should be strongly related to special functions involving mathematical analysis and its numerous applications. The main objective of this book is to highlight the importance of fundamental results and techniques of the theory of complex analysis for differential equations and PDEs and emphasizes articles devoted to the mathematical treatment of questions arising in physics, chemistry, biology, and engineering, particularly those that stress analytical aspects and novel problems and their solutions. Specific topics include but are not limited to Partial differential equations Least squares on first-order system Sequence and series in functional analysis Special functions related to fractional (non-integer) order control systems and equations Various

special functions related to generalized fractional calculus
Operational method in fractional calculus Functional analysis and operator theory Mathematical physics Applications of numerical analysis and applied mathematics Computational mathematics Mathematical modeling

This book provides the recent developments in special functions and differential equations and publishes high-quality, peer-reviewed book chapters in the area of nonlinear analysis, ordinary differential equations, partial differential equations, and related applications. This book develops a new system of modeling and simulations based on intelligence system. As we are directly moving from Third Industrial Revolution (IR3.0) to Fourth Industrial Revolution (IR4.0), there are many emergence techniques and algorithm that appear in many sciences and engineering branches. Nowadays, most industries are using IR4.0 in their product development as well as to refine their products. These include simulation on oil rig drilling, big data analytics on consumer analytics, fastest algorithm for large-scale numerical simulations and many more. These will save millions of dollar in the operating costs. Without any doubt, mathematics, statistics and computing are well blended to form an intelligent system for simulation and modeling. Motivated by this rapid development, in this book, a total of 41 chapters are contributed by the respective experts. The main scope of the book is to develop a new system of modeling and simulations based on machine learning, neural networks, efficient numerical algorithm and statistical methods. This book is highly suitable for postgraduate students, researchers as well as scientists that have interest in intelligent numerical modeling and simulations. This book presents a detailed overview of the firearms used in Oman over the last four centuries. Portable firearms, rifles and cannons are all discussed in detail with supporting illustrations. The weapons described in this book are mostly from the National Museum Oman and Bait al Zubair Museum in Muscat. "This book presents a unique

integration of knowledge from multidisciplinary fields of engineering, industrial design, and medical science for the healthcare of a specific user group"--Provided by publisher. **Electrochemical Membrane Technology for Water and Wastewater Treatment** consolidates state-of-the-art research developments in electrochemical membrane technology in water reclamation and sustainability in terms of fundamental theories, membrane and electrode materials, reactor designs, and fouling control mechanisms and applications.

Fundamental theories and applications of electrochemical membrane technology are detailed, with emerging applications of electrochemical membrane technology introduced. The knowledge gaps and future research perspectives in electrochemical membrane technology are also addressed. This book is an excellent resource for understanding fundamental theories, the latest developments, and future prospects in electrochemical membrane technology. The concepts presented in this book can benefit a broad audience of researchers and engineers working in water purification, membrane technology and electrochemical process. Consolidates scattered knowledge of electrochemical membrane technology into a more assessible resource Provides a comprehensive review of fundamental theories, membrane materials and module design as well as the latest developments in electrochemical membrane technology Provides a state-of-the-art review on the applications of electrochemical membrane technology Includes detailed discussions on the challenges and prospects of electrochemical membrane technology in different applications Presents an excellent reference for the education and understanding of water treatment, wastewater treatment, membrane technology, electrochemical technology, environmental science and technology, and the latest research and developments No single volume has been entirely devoted to the properties of magnetic lenses, so far as I am aware, although of course all the numerous textbooks on electron optics devote space to them. The absence of such a

volume, bringing together information about the theory and practical design of these lenses, is surprising, for their introduction some fifty years ago has created an entirely new family of commercial instruments, ranging from the now traditional transmission electron microscope, through the reflection and transmission scanning microscopes, to columns for micromachining and microlithography, not to mention the host of experimental devices not available commercially. It therefore seemed useful to prepare an account of the various aspects of magnetic lens studies. These divide naturally into the five chapters of this book: the theoretical background, in which the optical behaviour is described and formulae given for the various aberration coefficients; numerical methods for calculating the field distribution and trajectory tracing; extensive discussion of the paraxial optical properties and aberration coefficients of practical lenses, illustrated with curves from which numerical information can be obtained; a complementary account of the practical, engineering aspects of lens design, including permanent magnet lenses and the various types of superconducting lenses; and finally, an up-to-date survey of several kinds of highly unconventional magnetic lens, which may well change the appearance of future electron optical instruments very considerably after they cease to be unconventional. "Titles of chemical papers in British and foreign journals" included in Quarterly journal, v. 1-12. Sustainable Material Solutions for Solar Energy Technologies: Processing Techniques and Applications provides an overview of challenges that must be addressed to efficiently utilize solar energy. The book explores novel materials and device architectures that have been developed to optimize energy conversion efficiencies and minimize environmental impacts. Advances in technologies for harnessing solar energy are extensively discussed, with topics including materials processing, device fabrication, sustainability of materials and manufacturing, and

current state-of-the-art. Leading international experts discuss the applications, challenges, and future prospects of research in this increasingly vital field, providing a valuable resource for students and researchers working in this field. Explores the fundamentals of sustainable materials for solar energy applications, with in-depth discussions of the most promising material solutions for solar energy technologies: photocatalysis, photovoltaic, hydrogen production, harvesting and storage Discusses the environmental challenges to be overcome and importance of efficient materials utilization for clean energy Looks at design materials processing and optimization of device fabrication via metrics such as power-to-weight ratio, effectiveness at EOL compared to BOL, and life-cycle analysis

Biometric Solutions for Authentication in an E-World provides a collection of sixteen chapters containing tutorial articles and new material in a unified manner. This includes the basic concepts, theories, and characteristic features of integrating/formulating different facets of biometric solutions for authentication, with recent developments and significant applications in an E-world. This book provides the reader with a basic concept of biometrics, an in-depth discussion exploring biometric technologies in various applications in an E-world. It also includes a detailed description of typical biometric-based security systems and up-to-date coverage of how these issues are developed. Experts from all over the world demonstrate the various ways this integration can be made to efficiently design methodologies, algorithms, architectures, and implementations for biometric-based applications in an E-world. Fractional-order Modelling of Dynamic Systems with Applications in Optimization, Signal Processing and Control introduces applications from a design perspective, helping readers plan and design their own applications. The book includes the different techniques employed to design fractional-order systems/devices comprehensively and straightforwardly. Furthermore, mathematics is available in the

literature on how to solve fractional-order calculus for system applications. This book introduces the mathematics that has been employed explicitly for fractional-order systems. It will prove an excellent material for students and scholars who want to quickly understand the field of fractional-order systems and contribute to its different domains and applications. Fractional-order systems are believed to play an essential role in our day-to-day activities. Therefore, several researchers around the globe endeavor to work in the different domains of fractional-order systems. The efforts include developing the mathematics to solve fractional-order calculus/systems and to achieve the feasible designs for various applications of fractional-order systems. Presents a simple and comprehensive understanding of the field of fractional-order systems Offers practical knowledge on the design of fractional-order systems for different applications Exposes users to possible new applications for fractional-order systems Developing correct and efficient software is far more complex for parallel and distributed systems than it is for sequential processors. Some of the reasons for this added complexity are: the lack of a universally acceptable parallel and distributed programming paradigm, the criticality of achieving high performance, and the difficulty of writing correct parallel and distributed programs. These factors collectively influence the current status of parallel and distributed software development tools efforts. Tools and Environments for Parallel and Distributed Systems addresses the above issues by describing working tools and environments, and gives a solid overview of some of the fundamental research being done worldwide. Topics covered in this collection are: mainstream program development tools, performance prediction tools and studies; debugging tools and research; and nontraditional tools. Audience: Suitable as a secondary text for graduate level courses in software engineering and parallel and distributed systems, and as a reference for researchers and practitioners in industry. This

book is an effort towards an in-depth understanding of the architectural discourse in Egypt developed over more than eight decades. It offers a distinctive theoretical interpretation of the forces shaping the kaleidoscopic shifts in Egyptian architecture through the analysis of the micro space of architectural representation of twentieth century Egyptian architecture. Predicated on historical contextualization, theoretical integration, and global conceptualization, Edward Said's analytical method of contrapuntal reading and the spatial discourse analysis posited by C. Greig Crysler are lucidly assimilated to generate insights into various voices within the architectural discourse in Egypt. The analysis and critique of two important professional magazines, al-'Imarah (1939–1959) and 'Alam al-Bena'a (1980–2000), which shaped the collective psyche of both the academic and professional communities in Egypt and the wider region, coupled with the exploration of two other short-lived magazines, M'imaryah (1982–1989) Medina (1998–2002), and other less-influential professional magazines, discloses the structure of attitude and reference or the exclusions and inclusions that defined the boundaries of the space of the discourse. Influence and Resistance in Post-Independence Egyptian Architecture paves the way to genuinely debate a yet to mature twenty-first century's architectural discourse in Egypt. This book is a key resource for architects, architectural historians, and critical theorists and will appeal to academics and to both graduate and advanced undergraduate students in architectural history and theory and Middle East and Global South studies. This book explores recent developments in theoretical research and mathematical modelling of real-world complex systems, organized in four parts. The first part of the book is devoted to the mathematical tools for the design and analysis in engineering and social science study cases. We discuss the periodic evolutions in nonlinear chemical processes, vibro-compact systems and their behaviour, different types of metal–semiconductor self-

assembled samples, made of silver nanowires and zinc oxide nanorods. The second part of the book is devoted to mathematical description and modelling of the critical events, climate change and robust emergency scales. In three chapters, we consider a climate-economy model with endogenous carbon intensity and the behaviour of Tehran Stock Exchange market under international sanctions. The third part of the book is devoted to fractional dynamic and fractional control problems. We discuss the novel operational matrix technique for variable-order fractional optimal control problems, the nonlinear variable-order time fractional convection–diffusion equation with generalized polynomials. The fourth part of the book concerns solvability and inverse problems in differential and integro-differential equations. The book facilitates a better understanding of the mechanisms and phenomena in nonlinear dynamics and develops the corresponding mathematical theory to apply nonlinear design to practical engineering. It can be read by mathematicians, physicists, complex systems scientists, IT specialists, civil engineers, data scientists and urban planners. The complexity of AC motor control lies in the multivariable and nonlinear nature of AC machine dynamics. Recent advancements in control theory now make it possible to deal with long-standing problems in AC motors control. This text expertly draws on these developments to apply a wide range of model-based control design methods to a variety of AC motors. Contributions from over thirty top researchers explain how modern control design methods can be used to achieve tight speed regulation, optimal energetic efficiency, and operation reliability and safety, by considering online state variable estimation in the absence of mechanical sensors, power factor correction, machine flux optimization, fault detection and isolation, and fault tolerant control. Describing the complete control approach, both controller and observer designs are demonstrated using advanced nonlinear methods, stability and performance are analysed using powerful

techniques, including implementation considerations using digital computing means. Other key features:

- Covers the main types of AC motors including triphase, multiphase, and doubly fed induction motors, wound rotor, permanent magnet, and interior PM synchronous motors
- Illustrates the usefulness of the advanced control methods via industrial applications including electric vehicles, high speed trains, steel mills, and more
- Includes special focus on sensorless nonlinear observers, adaptive and robust nonlinear controllers, output-feedback controllers, fault detection and isolation algorithms, and fault tolerant controllers

This comprehensive volume provides researchers and designers and R&D engineers with a single-source reference on AC motor system drives in the automotive and transportation industry. It will also appeal to advanced students in automatic control, electrical, power systems, mechanical engineering and robotics, as well as mechatronic, process, and applied control system engineers. "Titles of chemical papers in British and foreign journals" included in Quarterly journal, v. 1-12.

The book is devoted to recent developments in the theory of fractional calculus and its applications. Particular attention is paid to the applicability of this currently popular research field in various branches of pure and applied mathematics. In particular, the book focuses on the more recent results in mathematical physics, engineering applications, theoretical and applied physics as quantum mechanics, signal analysis, and in those relevant research fields where nonlinear dynamics occurs and several tools of nonlinear analysis are required. Dynamical processes and dynamical systems of fractional order attract researchers from many areas of sciences and technologies, ranging from mathematics and physics to computer science. This book addresses the needs of students, researchers, as well as engineers and other professionals or readers interested in recent advances of biofuel and efficient waste management. In the context of energy consumption, over 85% of the total consumed

energy comes from non-renewable fossil resources. Developing new renewable energy resources, especially biofuel production from wastes, has received increasing attention. The book is organized into three sections, namely Section I: Conventional waste management; Section II: From waste to green energy; and Section III: Case studies and future perspectives. Each section presents topic-specific chapters, which contain comprehensive and advanced knowledge of the subjects. Overall, the book covers the recent advances, breakthroughs, challenges, and future perspectives of waste-to-energy approach using different kinds of wastes as a feedstock for alternative biofuels and other integrated approaches such as wastewater treatment, plastic degradation, and CO₂ sequestration in a cost-effective and eco-friendly way. In addition, different routes of waste recycling for enhanced biofuel production and case studies are presented with environmental and economic analysis. The presented case studies and future perspectives under Section III complement the chapters as they are authored by experts from bioenergy businesses who actually encounter real-world problems.

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